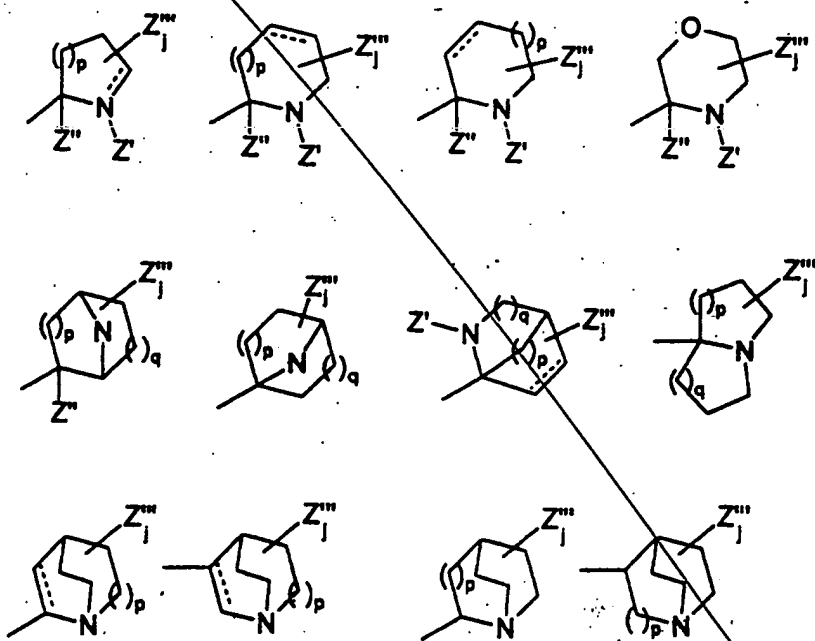


In re application of: **DULL ET AL.**  
 Serial No: **09/845,526**  
 Filed: **April 30, 2001**  
 For: **PHARMACEUTICAL COMPOSITIONS AND METHODS FOR USE**

Examiner: **V. Balasubramanian**  
 Group Art Unit: **1624**

quinolinylnyl, and  $r$  is an integer from 1 to 6, or  $R'$  and  $R''$  can together form a cycloalkyl [functionality] group;  $m$  is an integer and  $n$  is an integer such that the sum of  $m$  plus  $n$  is 0, 1, 2 or 3;  $E$ ,  $E'$ ,  $E''$  and  $E'''$  individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and  $Q$  is selected from:



where  $Z'$  represents hydrogen or lower alkyl, acyl, alkoxy carbonyl, or aryloxy carbonyl;  $Z''$  is hydrogen or lower alkyl; and  $Z'''$  is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond,  $p$  is 0, 1 or 2;  $q$  is 0, 1, 2 or 3; and  $j$  is an integer from 0 to 3.

16. (Twice Amended) A compound of the formula:

In re application of: DULL ET AL.

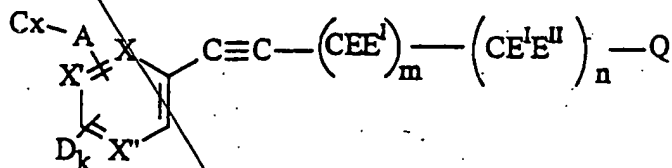
Serial No: 09/845,526

Filed: April 30, 2001

Examiner: V. Balasubramanian

Group Art Unit: 1624

For: PHARMACEUTICAL COMPOSITIONS AND METHODS FOR USE



where X'' is nitrogen and X, X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R'', -CF<sub>3</sub>, -CN, -NO<sub>2</sub>, -C<sub>2</sub>R', -SR', -N<sub>3</sub>, C(=O)NR'R'', -NR'C(=O)R'', -C(=O)R', -C(=O)OR', -OC(=O)R', -O(CR'R'')<sub>r</sub>C(=O)R', -O(CR'R'')<sub>r</sub>NR'R'', -O(CR'R'')<sub>r</sub>NR''C(=O)R', -O(CR'R'')<sub>r</sub>NR''SO<sub>2</sub>R', -OC(=O)NR'R'', -NR'C(=O)O R'', -SO<sub>2</sub>R', -SO<sub>2</sub>NR'R'', and -NR'SO<sub>2</sub>R'', where R' and R'' are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinoliny, and r is an integer from 1 to 6, or R' and R'' can together form a cycloalkyl [functionality] group; A is O, C=O or a covalent bond; D is a suitable non-hydrogen substituent species selected from the group of substituent species for X, X' and X''; k is 0, 1 or 2; Cx is selected from a group consisting of aryl, substituted aryl, heteroaryl, substituted heteroaryl, non-aromatic heterocyclyl, substituted non-aromatic heterocyclyl, non-aromatic heterocyclylalkyl and substituted non-aromatic heterocyclylalkyl; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E', E'' and E''' individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from:

In re application of: **DULL ET AL.**

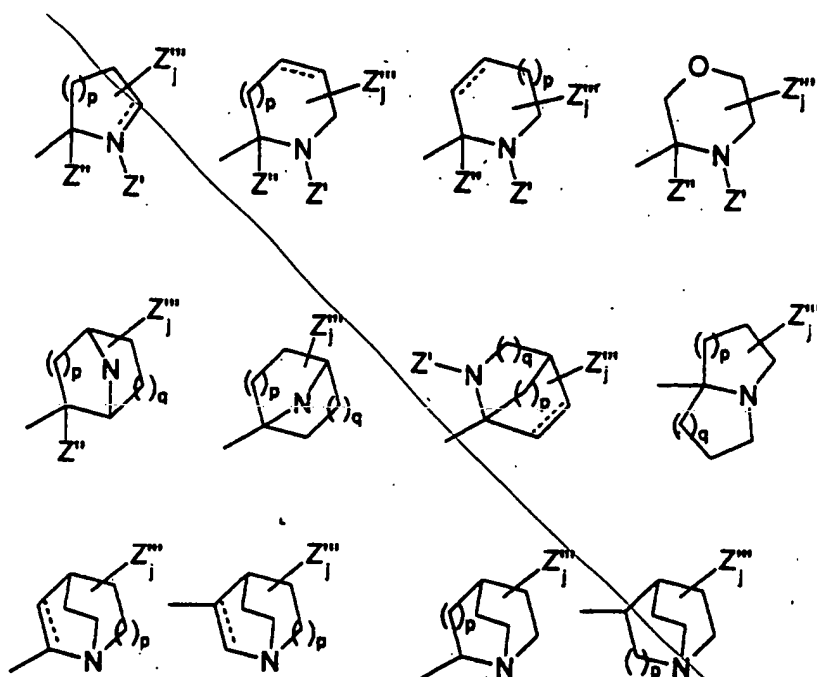
Serial No: **09/845,526**

Filed: **April 30, 2001**

For: **PHARMACEUTICAL COMPOSITIONS AND METHODS FOR USE**

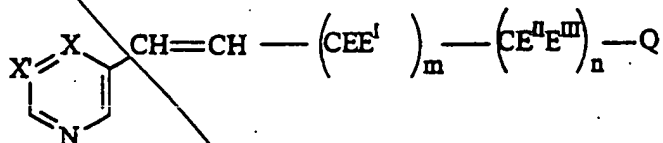
Examiner: **V. Balasubramanian**

Group Art Unit: **1624**



where Z' represents hydrogen or lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z'' is hydrogen or lower alkyl; and Z''' is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond; p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3.

25. (Twice Amended) A pharmaceutical composition incorporating a compound of



where X and X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R'', -CF<sub>3</sub>, -CN, -NO<sub>2</sub>, -C<sub>2</sub>R', -SR', -N<sub>3</sub>, C(=O)NR'R'', -NR'C(=O)R'', -C(=O)R', -C(=O)OR', -OC(=O)R', -O(CR'R''), C(=O)R', -O(CR'R'')<sub>n</sub>NR'R'', -O(CR'R'')<sub>n</sub>NR'C(=O)R', -O(CR'R'')<sub>n</sub>NR''SO<sub>2</sub>R', -OC(=O)NR'R'', -NR'C(=O)OR'', -SO<sub>2</sub>R', -SO<sub>2</sub>NR'R'', and -NR'SO<sub>2</sub>R'', where R' and R'' are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group

In re application of: **DULL ET AL.**

Serial No: **09/845,526**

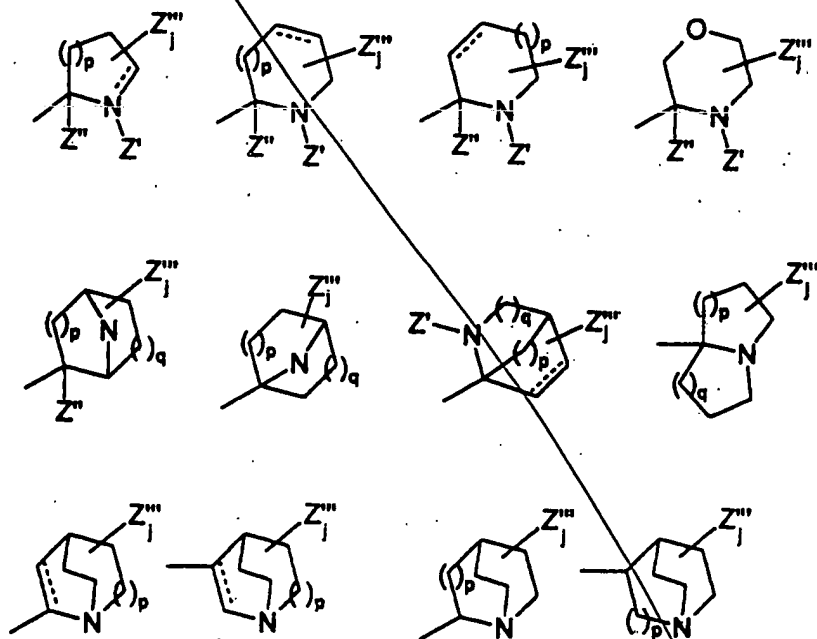
Filed: **April 30, 2001**

For: **PHARMACEUTICAL COMPOSITIONS AND METHODS FOR USE**

Examiner: **V. Balasubramanian**

Group Art Unit: **1624**

consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and  $r$  is an integer from 1 to 6, or  $R'$  and  $R''$  can together form a cycloalkyl [functionality] group;  $m$  is an integer and  $n$  is an integer such that the sum of  $m$  plus  $n$  is 0, 1, 2 or 3;  $E$ ,  $E'$ ,  $E''$  and  $E'''$  individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and  $Q$  is selected from:



where  $Z'$  represents hydrogen or lower alkyl, acyl, alkoxy carbonyl, or aryloxy carbonyl;  $Z''$  is hydrogen or lower alkyl; and  $Z'''$  is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond;  $p$  is 0, 1 or 2;  $q$  is 0, 1, 2 or 3; and  $j$  is an integer from 0 to 3, along with a pharmaceutically acceptable carrier.

In re application of: DULL ET AL.

Serial No: 09/845,526

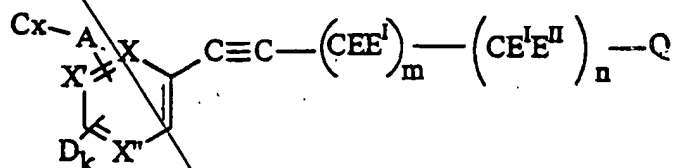
Filed: April 30, 2001

For: PHARMACEUTICAL COMPOSITIONS AND METHODS FOR USE

Examiner: V. Balasubramanian

Group Art Unit: 1624

41. (Twice Amended) A pharmaceutical composition incorporating a compound of the formula:



where X'' is nitrogen and X and X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen, alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R'', -CF<sub>3</sub>, -CN, -NO<sub>2</sub>, -C<sub>2</sub>R', -SR', -N<sub>3</sub>, C(=O)NR'R'', -NR'C(=O)R'', -C(=O)R', -C(=O)OR', -OC(=O)R', -O(CR'R''), C(=O)R', -O(CR'R''), NR'R'', -O(CR'R''), NR''C(=O)R', -O(CR'R''), NR''SO<sub>2</sub>R', -OC(=O)NR'R'', -NR'C(=O)OR'', -SO<sub>2</sub>R', -SO<sub>2</sub>NR'R'', and -NR'SO<sub>2</sub>R'', where R' and R'' are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R'' can together form a cycloalkyl [functionality] group; A is O, C=O or a covalent bond; D is a suitable non-hydrogen substituent species selected from the group of substituent species for X, X' and X''; k is 0, 1 or 2; Cx is selected from a group consisting of aryl, substituted aryl, heteroaryl, substituted heteroaryl, non-aromatic heterocyclyl, substituted non-aromatic heterocyclyl, non-aromatic heterocyclylalkyl and substituted non-aromatic hetero-cyclylalkyl; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E<sup>I</sup>, E<sup>II</sup> and E<sup>III</sup> individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from:

In re application of: **DULL ET AL.**

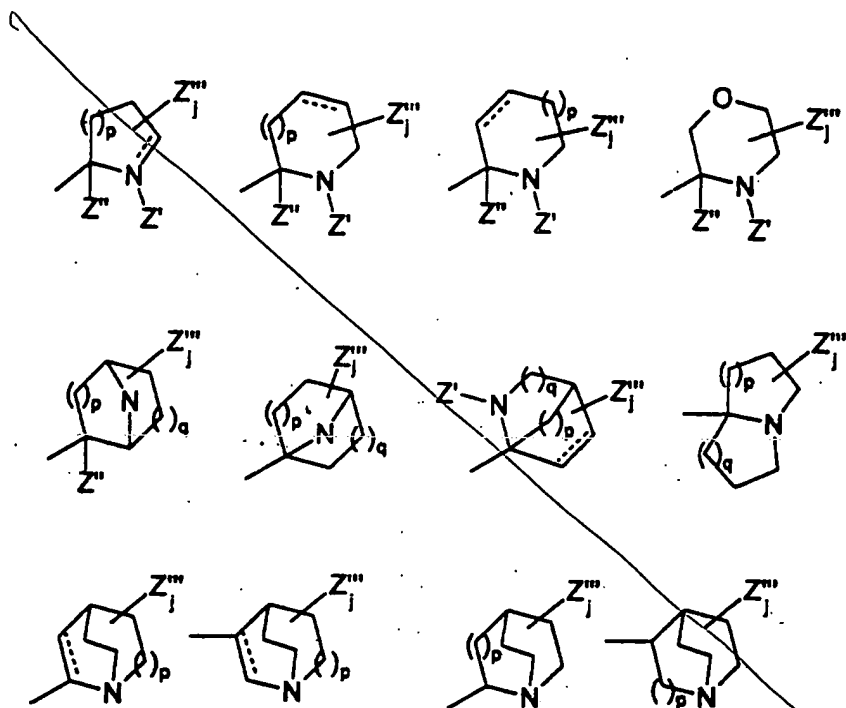
Serial No: **09/845,526**

Filed: **April 30, 2001**

For: **PHARMACEUTICAL COMPOSITIONS AND METHODS FOR USE**

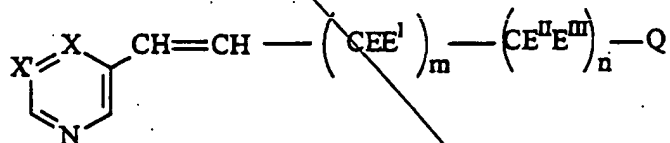
Examiner: **V. Balasubramanian**

Group Art Unit: **1624**



where Z' represents hydrogen or lower alkyl, acyl, alkoxycarbonyl, or aryloxycarbonyl; Z'' is hydrogen or lower alkyl; and Z''' is a non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; the dotted line indicates a carbon-carbon single bond or a carbon-carbon double bond; p is 0, 1 or 2; q is 0, 1, 2 or 3; and j is an integer from 0 to 3, and a pharmaceutically acceptable carrier.

51. (Twice Amended) A method for treating a central nervous system disorder associated with dysfunction of nicotinic receptors, said method comprising administering an effective amount of a compound having the formula:



Sub  
CS

where X and X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen, alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R'', -CF<sub>3</sub>, -CN, -NO<sub>2</sub>, -C<sub>2</sub>R', -SR', -N<sub>3</sub>, C(=O)NR'R'', -NR'C(=O)R'', -C(=O)R', -C(=O)OR', -OC(=O)R', -O(CR'R'')<sub>j</sub>C(=O)R', -O(CR'R'')<sub>j</sub>NR'R'', -O(CR'R'')<sub>j</sub>NR'C(=O)R', -O(CR'R'')<sub>j</sub>NR''SO<sub>2</sub>R', -OC(=O)NR'R'', -NR'C(=O)O

In re application of: **DULL ET AL.**

Serial No: **09/845,526**

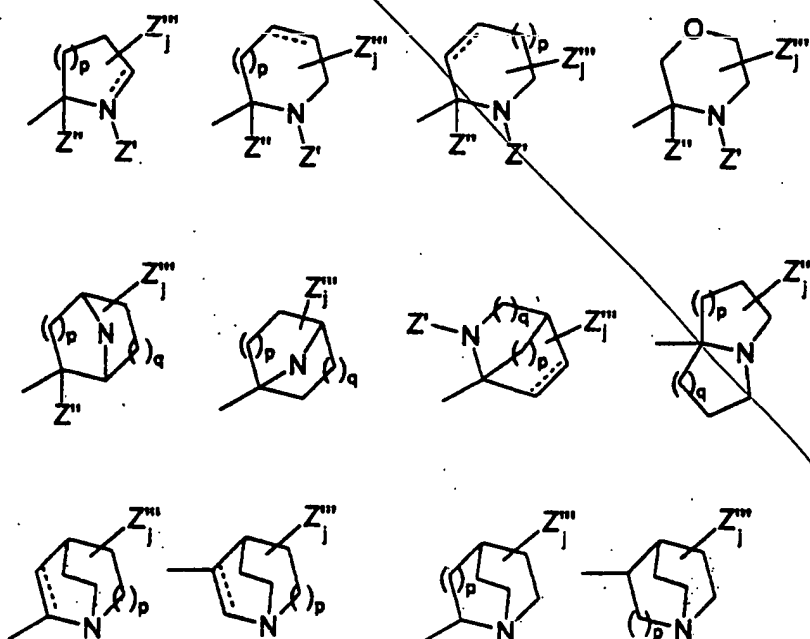
Filed: **April 30, 2001**

For: **PHARMACEUTICAL COMPOSITIONS AND METHODS FOR USE**

Examiner: **V. Balasubramanian**

Group Art Unit: **1624**

$R''$ ,  $-\text{SO}_2R'$ ,  $-\text{SO}_2\text{NR}'R''$ , and  $-\text{NR}'\text{SO}_2R''$ , where  $R'$  and  $R''$  are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and  $r$  is an integer from 1 to 6, or  $R'$  and  $R''$  can together form a cycloalkyl [functionality] group;  $m$  is an integer and  $n$  is an integer such that the sum of  $m$  plus  $n$  is 0, 1, 2 or 3;  $E$ ,  $E'$ ,  $E''$  and  $E'''$  individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and  $Q$  is selected from:



66. (Twice Amended) A method for treating a central nervous system disorder associated with dysfunction of nicotinic receptors, said method comprising of the administration of an effective amount of a compound having the formula:

Handwritten notes: *BK*, *Sub*, *Cb*

In re application of: DULL ET AL.

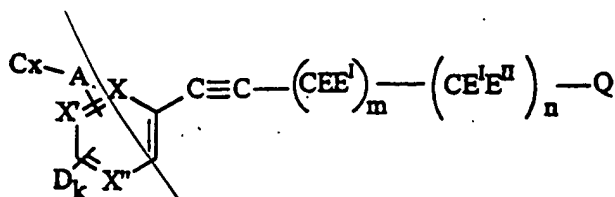
Serial No: 09/845,526

Filed: April 30, 2001

For: PHARMACEUTICAL COMPOSITIONS AND METHODS FOR USE

Examiner: V. Balasubramanian

Group Art Unit: 1624



where X'' is nitrogen, X and X' are individually carbon bonded to a substituent species selected from the group consisting of hydrogen, alkyl, substituted alkyl, alkenyl, substituted alkenyl, heterocyclyl, substituted heterocyclyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl; arylalkyl, substituted arylalkyl, halo, -OR', -NR'R'', -CF<sub>3</sub>, -CN, -NO<sub>2</sub>, -C<sub>2</sub>R', -SR', -N<sub>3</sub>, C(=O)NR'R'', -NR'C(=O)R'', -C(=O)R', -C(=O)OR', -OC(=O)R', -O(CR'R''), C(=O)R', -O(CR'R''), NR'R'', -O(CR'R''), NR'C(=O)R', -O(CR'R''), NR'SO<sub>2</sub>R', -OC(=O)NR'R'', -NR'C(=O)OR'', -SO<sub>2</sub>R', -SO<sub>2</sub>NR'R'', and -NR'SO<sub>2</sub>R'', where R' and R'' are individually hydrogen, lower alkyl, cycloalkyl, heterocyclyl, or an aromatic group-containing species selected from the group consisting of phenyl, benzyl, pyridinyl, pyrimidinyl, pyrazinyl, pyridazinyl, indolyl and quinolinyl, and r is an integer from 1 to 6, or R' and R'' can together form a cycloalkyl [functionality] group; A is O, C=O or a covalent bond; D is a suitable non-hydrogen substituent species selected from the group of substituent species for X, X' and X''; k is 0, 1 or 2; Cx is selected from a group consisting of aryl, substituted aryl, heteroaryl, substituted heteroaryl, non-aromatic heterocyclyl, substituted non-aromatic heterocyclyl, non-aromatic heterocyclylalkyl and substituted non-aromatic hetero-cyclylalkyl; m is an integer and n is an integer such that the sum of m plus n is 0, 1, 2 or 3; E, E<sup>I</sup>, E<sup>II</sup> and E<sup>III</sup> individually represent hydrogen or a suitable non-hydrogen substituent selected from the group consisting of alkyl, substituted alkyl, halo-substituted alkyl, cycloalkyl, substituted cycloalkyl, heterocyclyl, substituted heterocyclyl, aryl, substituted aryl, alkylaryl, substituted alkylaryl, arylalkyl and substituted arylalkyl; and Q is selected from: